



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/022,360      | 12/20/2001  | Evelyn Boettcher     | P 281094 OS-0007    | 3695             |

909 7590 04/23/2003

PILLSBURY WINTHROP, LLP  
P.O. BOX 10500  
MCLEAN, VA 22102

EXAMINER

CALEY, MICHAEL H

ART UNIT PAPER NUMBER

2882

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |  |                     |  |
|------------------------------|------------------------|--|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> |  | <b>Applicant(s)</b> |  |
|                              | 10/022,360             |  | BOETTCHER ET AL.    |  |
|                              | <b>Examiner</b>        |  | <b>Art Unit</b>     |  |
|                              | Michael H. Caley       |  | 2882                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 13-17 and 19-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 18 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☒ Claim(s) 13-17 and 19-21 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-12 and 18, drawn to a communication systems tunable optical filter, classified in class 385, subclass 37.
- II. Claims 13-17, drawn to a method of filtering an optical signal, classified in class 359, subclass 130.
- III. Claims 19-21, drawn to a method of making a tunable optical filter, classified in class 385, subclass 37.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case the apparatus as disclosed in claim 1 may be used as a switch using reflective properties of the grating or as a housing for an optical fiber grating.

Inventions I and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the

Art Unit: 2882

apparatus as disclosed in claim 1 may be constructed by attaching or otherwise inserting the optical fiber in the support block after it is formed.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Henry Daley on 4/1/03 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-12 and 18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 13-17 and 19-21 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Claim Objections***

Claim 12 is objected to because of the following informalities:

Line contains a reference to a "said substantially rigid plate" which lacks antecedent basis. Claim is assumed to be dependent on claim 4 for examination on the merits. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6, 9-11, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hay et al. (U.S. Patent No. 6,278,811 "Hay").

Regarding claim 1, Hay discloses a device having:

a compliant support block (Figure 2 element 12) having a longitudinal axis and a load receiving surface oriented substantially orthogonal to said longitudinal axis (Column 5 lines 7-14), the load receiving surface being suitable to receive an applied load in a direction substantially parallel to said longitudinal axis (Figures 1 and 2 elements 50 and 51);

and an optical fiber having at least a section with a fiber Bragg grating written therein disposed in the compliant support block (Figures 1 and 2),

wherein the fiber Bragg grating has a variation in refractive index along an axial direction thereof (Column 4 lines 15-34).

In the first embodiment, Hay fails to disclose the optical fiber as arranged in a configuration at least partially encircling the longitudinal axis of the compliant support block. In

Art Unit: 2882

further embodiments, however, Hay teaches various alternative fiber and block arrangements in which the fiber is arranged to be at least partially encircling the longitudinal axis parallel to the direction of force applied (Figures 7-10; Column 8 lines 42-56, Column 9 lines 25-34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the pressure sensor in such an alternative embodiment in which the fiber encircles the longitudinal axis parallel to which the force is applied. Such an alternative arrangement of the optical fiber would alter the amount of strain imposed on the fiber during deformation of the block. One would have been motivated to create such a change in the sensitivity of the detector in order to tailor the sensor to the range of pressures and precision required for the detector.

Regarding claim 2, Hay discloses an embodiment of the device in which the optical fiber having at least a section with a fiber Bragg grating written therein is arranged in a spiral fashion with a fixed pitch around the longitudinal axis (Figure 8).

Regarding claim 3, Hay discloses the device as having a support frame (Figure 1 element 18) having an opening along a side (Figure 1 element 60) suitable to allow the compliant support block to expand orthogonally to the longitudinal axis in response to the applied load in the direction parallel to the longitudinal axis. Decrease of pressure applicable through the opening would allow the support block to expand orthogonally.

Regarding claim 4, Hay discloses the device as having a substantially rigid plate disposed proximate said load receiving surface of said compliant support block (Figure 6 element 102; Figure 1 element 18, end adjacent element 50).

Art Unit: 2882

Regarding claim 5, Hay discloses the material of the compliant support block as glass. Hay fails to disclose the material of the compliant support block as comprising a polymer. The Examiner takes Official notice, however, that use of a plastic for a support block of an optical fiber grating pressure sensor is old and well known in the art as a pressure receiving and strain applying means.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed the block of a polymer. Such an embodiment would have been effective to change the pressure to applied strain properties of the device compared to the sensor disclosed by Hay. One would have been motivated to construct the same pressure sensor out of a plastic in order to increase the sensitivity of the sensor, such as in a case when measuring a smaller amount of pressure over a smaller range. Constructing the pressure sensor out of a polymer would have been effective to increase the sensitivity of the device in applying an axial strain to the fiber and one would have been motivated to make the change to benefit from the expected results of such a modification.

Regarding claim 6, Hay fails to disclose the support block as constructed from a visco-elastic or elastic polymer. Such a modification would have been an engineering expediency to optimize the device as disclosed by Hay for a particular application such as in a sensor measuring a relatively lower amount of pressure.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed the block of a visco-elastic polymer or an elastic polymer. Such a choice of material would have been motivated by a desire to benefit from the expected results to one of ordinary skill in the art, such as a higher sensitivity to pressure than glass.

Art Unit: 2882

Regarding claim 9, Hay discloses the support block as having a cylindrical shape and the end face of the support block as being the load-receiving surface (Figures 1, 7, and 8).

Regarding claim 10, Hay discloses the fiber Bragg grating as disposed in the compliant support block as having a spiral configuration in which an axis of the spiral configuration of the fiber Bragg grating coincides with the longitudinal axis of the cylindrical block (Figures 8-10).

Regarding claim 11, Hay discloses a load generating assembly as attached to the support frame (Figure 1 element 60).

Regarding claim 18, Hay discloses an embodiment of a pressure sensing system in which a plurality of gratings may be connected in series by a fiber to multiple pressure points as distributed sensors. Hay discloses wavelength-division multiplexing as a means of interpreting the signals from the various gratings. In such an application, it would have been inherent to have such a multiplexing scheme as proposed having a plurality of transmitters, an optical multiplexer, signal transmission waveguides, and a plurality of receivers to detect the signals, the pressure sensor acting as the tunable optical filter.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hay in view of Bittleston (U.S. Patent No. 5,745,436).

Hay discloses all of the proposed limitations except for the support block as comprising microspheres. Bittleston, however, teaches glass microspheres in a pressure sensing device in order to reduce its density (Column 4 lines 1-4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included glass microspheres in an embodiment of the block comprised of a



Art Unit: 2882

material other than glass. As taught by Bittleston, the glass microspheres would have been advantageous to alter the sensing properties of the hydrophone. One would have been motivated to incorporate glass microspheres in such an embodiment to optimize the sensing characteristic of the device to a particular application.

*Allowable Subject Matter*

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art fails to disclose a combination of a compliant support block and optical fiber with a Bragg grating as proposed in which a rigid plate is disposed near the load-receiving surface of the support block having a micrometer screw assembly attached to apply a load to the support block, transferred through the substantially rigid plate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael H. Caley whose telephone number is (703) 305-7913. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Application/Control Number: 10/022,360

Page 9

Art Unit: 2882

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

mhc  
April 8, 2003

1  
SEARCHED  
SERIALIZED  
INDEXED  
FILED